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THE EFFECTS OF RATER STRESS ON PERFORMANCE RATING
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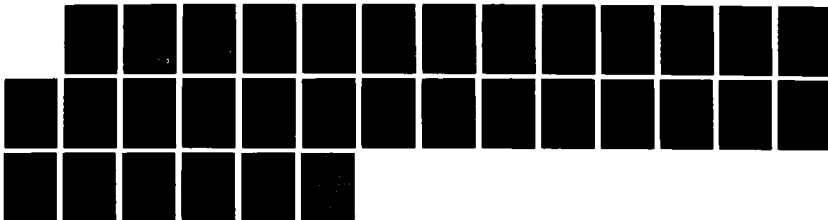
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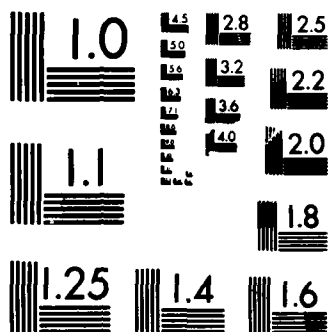
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Human Resources Research

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ON PERFORMANCE RATING ACCURACY

Amy Beth Powell
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and
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Texas A&M University
and
Virginia Polytechnic Institute

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accurate than those provided by participants completing the non-stressful in-basket. However, ratings provided by these two groups showed no differences in halo or severity error. In addition, raters who completed the in-basket after seeing the target performance but before rating that performance provided less accurate ratings than those completing the in-basket before observing and rating the performance. These results indicate that rater stress may lead to greater appraisal inaccuracy, and that this inaccuracy is largely a function of faulty information retrieval.

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THE EFFECTS OF RATER STRESS ON PERFORMANCE RATING ACCURACY

Performance appraisal systems ultimately rely on judgments about an individual behavior made by one or more other persons. Many years of research on performance appraisals indicate that these judgments are vulnerable to bias or distortion. A recent trend in performance rating research is to address the cognitive processes that are involved when raters obtain information about and make ratings of a person's performance.

Cognitive Categorization In Performance Appraisal

Cognitive models of performance rating have been presented by DeNisi, Cafferty, and Meglino (1984), Ilgen and Feldman (1983), and Landy and Farr (1983). The common characteristic of these models is that the rater is an active seeker of information who processes information in a series of cognitive operations--first, observing the behavior or other cues that supply information concerning the ratee's performance, encoding this information, storing it in memory, and finally, retrieving it when the time comes to make an evaluation of the performance.

One process thought basic to the observation and encoding of performance information is categorization, an automatic coding of people in terms of certain common characteristics in a non-thinking or automatic way (Feldman, 1981). Categorization allows the rater to reduce the complexity and amount of performance information processed. Rosch and Mervis (1975) refer to "family resemblances" in defining the nature of categories. Each member shares some attributes with some, but not all, of the other members. the level of family resemblance, or typicality, of a member depends on the number of attributes it shares with other members. Some members, having greater typicality, are better examples of a category than are others.

This is similar to the prototype approach to categorization of Cantor & Mischel (1979). They maintain that we develop prototypes (abstract knowledge structures summarizing family resemblances among category members) as a means of grouping persons. Such prototypes allow one to organize knowledge about the probable behavior, attitudes, and other attributes of particular individuals. For example, the prototypic rock musician may be loud, irresponsible, promiscuous, a drug user, and a wild dresser. Therefore anyone labelled "rock musician" is likely to be automatically perceived as engaging in these behaviors and holding similar attitudes. This simplifies and reduces the need to learn, store, and recall information about individuals.

Categorization and the Rating process

When a rater is required to make a categorical judgment (e.g., "good worker") on the basis of limited knowledge of the ratee, the rater may search for particular, prototypic category attributes (e.g., punctuality, loyalty) and for the extent to which these attributes are consistently displayed

by the ratee. If the ratee is perceived to possess such prototypic attributes, he or she is likely to be assumed to possess other category attributes as well.

Ilgén and Feldman (1983) maintain that the performance appraisal task is better characterized as a memory-based judgment process than a stimulus-based one. Supervisors are often distracted during observations of subordinates and must often rely on categorizations that they have formed of the person, not unique features of current performance. The recalled behavior may be reconstructed on the basis of these prototypes. The rater may observe the ratee performing a selected number of behaviors (e.g. is courteous to customers, is on time) which are contained within the category of "good worker". Then, instead of attending to the ratee's other current characteristics or behaviors, the rater will attribute the other characteristics contained within the "good worker" prototype to that ratee. Therefore, any rating scale is subject to prototype-based distortion and halo-error, and purely evaluative responses (global ratings of "goodness") are thought to be based on stored evaluative impressions associated with these prototypes. Cooper (1981) argues from a similar viewpoint that halo error in ratings is strongly influenced by cognitive distortions based on "illusory" theories that raters develop about how behavioral dimensions covary.

STRESS AND THE RATING PROCESS

It is evident that some situations are more likely to result in categorization and the use of limited information in making performance appraisals. Cohen (1981) posits that raters under time constraints are more likely to recall only category-consistent information, as this requires less cognitive energy. This has been supported by research conducted in marketing and decision-making. For example, Staelin and Payne (1976) found that, when facing time pressure and distraction, shoppers tried to reduce search time by collecting fewer pieces of information and generally searching for negative information. Other research in decision-making has shown that judges facing time pressures or distractions use fewer cues in making decisions (Christensen-Szalanski, 1980) and rely more heavily on negative information (Wright, 1974), as negative information is seen more informative than positive information.

In line with the work of Staelin and Payne (1976) with pressured shoppers, and that of Christensen-Szalanski (1980) with pressured decision-makers, Srinivas and Motowidlo (1985) have found that the amount of stress on the rater can affect the performance rating process. They suggest that stress will lead a rater to rely on simple prototypes rather than actual information obtained from observing the performance of ratees, and this may contribute substantially to rating distortion.

Although there is no universally accepted conceptualization or definition of stress (Alluisi, 1982; Schuler, 1980), many have been offered (e.g. Caplan, Cobb,

French, Van Harrison, & Pinneau, 1975; Janis & Leventhal, 1968; Lazarus, Desse, & Osler, 1952; Margolis & Kroes, 1974; McGarth, 1976). Janis and Leventhal (1968) describe stress as an unpleasant emotional state, involving negative affective responses such as anxiety, irritation, and depression. Additionally, stress is partially due to environmental demands which threaten to exceed the individual's capabilities and resources for meeting them (Caplan, et al., 1975; McGarth, 1976). One such environmental situation, work overload, was used by Srinivas and Motowildo (1985) in their study on stress and information processing.

Cohen (1980), in a review of the literature on effects of stress on performance, found overwhelming evidence of a post-stimulation effect, especially when the stress is unpredictable. That is, the psychological state produced by stress endures, and influences behavior even after the stressor has been removed. This psychological state affects performance on subsequent tasks, particularly those tasks requiring tolerance for frustration, clerical accuracy, and the ability to avoid perceptual distractions. Effects of stress on social behavior include a decrease in sensitivity to others, helping behavior, recognition of individual differences, and an increase in aggression. There are two explanations of these post-stimulation effects of stress that may be considered applicable to a performance appraisal situation--the psychic cost hypothesis and the frustration--mood hypothesis (Cohen, 1980; Srinivas & Motowidlo, 1985).

The Psychic Cost Hypothesis. This theory has to do with the individual's limited attentional capacity (Miller, 1956), and states that the attentional capacity shrinks when there are prolonged demands placed on it. Therefore, prolonged exposure to an environmental stressor such as a high information rate task should result in cognitive fatigue, or an insufficient reserve of attention available for subsequent demanding tasks.

In accordance with Kahneman's effortful attention model (1973), there is an inverse relationship between the effort supplied to the main task and the spare capacity or effort available for processing subsequent tasks. Other researchers in the cognitive area (e.g., Eysenck, 1983; Hasher & Zacks, 1979) have shown that people experiencing high levels of stress tend to rely on automatic processing operations rather than controlled or effortful operations. Automatic processing proceeds without subject control or intention, does not interfere with other, ongoing cognitive activity, operates at a constant level under all conditions, and therefore does not stress the capacity limitations of the cognitive system. In contrast, controlled processing operations are under conscious control of the subject and are therefore capacity-limited and drain cognitive energy (Hasher & Zacks, 1979; Posner & Snyder, 1975; Schneider & Shrifin, 1977). Stress (a drain on cognitive energy) is believed to increase a person's reliance on the automatic mode of

information processing, since this mode requires less cognitive energy.

A possible consequence of this tendency to rely on automatic processing in a performance rating situation is that stressed individuals will rate another's performance based on an initial overall impression of general effectiveness (based on prototypic attributions), rather than attend to specific behavioral dimensions, since such attention would require a controlled processing mode. In summary, the psychic cost hypothesis would predict that a stressed rater will provide ratings of a single ratee that show less variability across dimensions (i.e., greater halo error) than ratings of that same ratee provided by a rater who has not been stressed (Srinivas & Motowidlo, 1985).

The Frustration-Mood Hypothesis. This theory (Cohen, 1980) states that exposure to stressors influences behavior, particularly social behaviors, by affecting mood. Stressed individuals experience feelings of frustration, annoyance, and irritation, which result in less motivation to perform subsequent tasks, and in less sensitivity to the needs of others. Negative mood states also result in increased aggression and other undesirable interpersonal behaviors. Mood states have been found to affect information processing in two ways: by influencing the type of information attended to, and by influencing the kind of information retrieved from memory.

The effects of emotional states on the kind of information attended to have been widely examined. It is consistently found that individuals attend to material congruent with their current mood (Bower, 1981; Bower & Cohen, 1982). Thus stressed raters are more likely to attend to negative information about the ratee's performance.

With regard to the effects of mood on information retrieval, it has been found that people are more likely to recall information that is congruent with their mood (Bower, 1981; Clark, Milberg, & Ross, 1983; Isen, Shalke, Clark, & Karp, 1978). Stressed raters experiencing negative mood states are likely to retrieve or recall negative information about the ratee's performance, and will form less favourable judgments of that performance (Srinivas & Motowidlo, 1985).

In addition to the accuracy of stressed individuals' ratings, another question concerning the effect of stress on the cognitive appraisal process is at what stage the process is affected. For example, DeNisi, Cafferty, and Meglino (1984) point out that raters facing a major stressor (time pressures) will seek fewer but more information cues, thereby reducing the "marginal cost" of gathering information. This implies that it is the input phase of processing that is affected. This type of narrowed search activity might also occur during retrieval of information. If stress does influence the process, the impact could be on the input phase (observation and storage), the retrieval phase, or both of these.

Srinivas and Motowidlo (1985) attempted to answer these questions (the psychic cost and frustration-mood predictions and the input vs. retrieval questions). In a simulated work setting, using a stressful vs. nonstressful in-basket task as the stress manipulation, and order of information presentation as the input vs. retrieval manipulation, they had subjects rate the videotaped performance of a subordinate. Subjects who were stressed prior to observing and rating the performance were affected by that stress during the input phase of the process, whereas subjects stressed after the observation but prior to rating the performance were affected during the retrieval phase. Dependent variables were severity and dispersion of ratings across performance dimensions (i.e., halo error). Ratings provided by stressed subjects showed less dispersion across performance dimensions (i.e., more halo), but no difference in favorability. Furthermore, the effects of stress on dispersion were significant only within the retrieval condition, suggesting that stress affects the retrieval phase of information processing.

Unfortunately, there is a major confound present in their design. Half of the subjects (those in the retrieval condition) observed the performance, then performed a 45-minute in-basket and several other questionnaire tasks before rating the performance they had observed. The time between observation and rating of the performance in this condition was at least one hour. The subjects in the input condition, however, performed the 45-minute in-basket prior to observing the performance, and then rated the performance immediately after the observation. The time between observation and rating for this group was less than 10 minutes. Since stressed subjects in the retrieval (one hour) group had significantly less dispersion than those in the input (10 minute) group, it is possible that the difference in the time delay for the two groups is, at least in part, responsible for this finding.

Hypotheses

The present study attempted to address similar issues to those investigated by Srinivas and Motowidlo (1985), with an altered experimental design to correct for the time delay confound in their study. We also looked at the effects of stress on a general measure of rating accuracy.

Hypothesis 1: The psychic cost theory predicts that stressed individuals will be more likely to operate in an automatic mode of cognitive processing in an effort to conserve cognitive energy. They will be more likely to base evaluative judgments of others' performance on overall impressions, rather than attend to or recall specific aspects of that performance. Therefore, a main effect of stress level on amount of halo error is predicted. Raters experiencing higher levels of stress should exhibit a greater amount of halo error (decreased dispersion) in rating the performance of subordinates.

Hypothesis 2: The frustration-mood theory maintains that stressed raters will experience a more negative mood state, and that this in turn will color judgments about the performance of others in a negative way. This may be due to a tendency for such individuals to seek out and attend to negative information, or to simply recall more negative information (Bower, 1981). Therefore, it is expected that raters experiencing higher levels of stress should exhibit more severity in rating the performance of subordinates.

Hypothesis 3: Implicit in Hypotheses 1 and 2 is the idea that stress affects rating accuracy. Further, both the psychic cost and frustration-mood theories suggest that under high stress conditions, raters do not use all information available to them in making performance ratings. If either the psychic cost or frustration-mood principles are operating during stressful conditions, it is expected that raters would be able to recall significantly less information about the ratee's performance than raters observing and retrieving information under conditions of low stress. This recall inhibition under stress may be due to the rater's decreased attentional capacities, or faulty memory.

Research question: The effect of rater stress on rating distortion may be observation-based, recall-based, or both. If it is observation-based, it is expected that the input phase will be more greatly affected by stress. If distortion due to stress is a recall-based phenomenon, it is expected that the retrieval phase will be more greatly affected by stress. This question will also be examined, although no specific predictions are made.

An additional question concerns the role of rater cognitive complexity as a possible moderator of the effects of rater stress on rating distortion. Cognitive complexity or selectivity is defined as the ability to differentially attend to multidimensional stimuli (Cardy & Kehoe, 1984). These authors have found that raters high on this characteristic tend to provide more accurate appraisal than other raters. However, Bernardin, Cardy, and Carlyle (1982) found no evidence to this effect. It seems reasonable to hypothesize that cognitively complex raters would be better able to process information even if stressed, while cognitively simple raters would be more likely to fall back on simple prototypes when stressed. This study will examine this question in an exploratory fashion.

METHOD

Sample

The sample consisted of 84 (53 male and 31 female) introductory psychology students who were randomly assigned to one of four experimental conditions in a 2 x 2 design. Students participated in order to fulfill course requirements.

Design

Research participants were told that the experiment was part of a project concerned with developing exercises for a managerial assessment center. They would assume the role of

a sales manager, and complete an in-basket exercise lasting 35 minutes, and several other tasks, including a performance rating. The study was a 2 x 2 design, in which two levels of work stress (high vs. low) were crossed with the timing of the stress and performance information presentation--during the input phase (stress level introduced before performance observation and ratings) or in the retrieval phase (stress level introduced after performance observation but before ratings).

Independent Variables

Stress conditions. Stress was manipulated using two versions of an in-basket exercise. One version was more difficult and required greater information processing (high stress) than the other version (low stress). Participants completing the high stress in-basket were interrupted frequently with additional information presented on a videotape depicting visits to the manager's office by his or her superior, subordinates, and others who provided additional information usually concerned with the in-basket materials. The interruptions consisted of an intercom buzz, a secretary announcing a visitor, the visitor entering the "office", then presenting the information, question, etc. Messages ranged in importance from those concerning major and immediate production problems, which called for immediate attention, to office gossip. Interruptions were made at variable time intervals and were of variable durations throughout the in-basket exercise. In this high stress group, in-basket materials included problems concerning interdepartmental conflicts, production delays, supervisor-subordinate problems, and general information about routine operations. In addition, these subjects were told that they must complete the exercise in 35 minutes.

Participants in the low stress condition completed a less complicated version of the in-basket, consisting of problems that were more routine. No interruptions occurred, and participants were told to complete as much of the in-basket as possible, but that it was not mandatory that they complete all of it.

Timing of stress presentation conditions. The timing of the stress presentation variable was manipulated by presenting half the participants with the performance information, via videotape, before they worked on the in-basket (stress was introduced during the retrieval phase) and presenting half the participants with the performance videotape after they had completed the in-basket (stress introduced during the input phase). The performance videotape used was one developed and scored by Borman, et al. (1976). This tape depicts a manager dealing with a subordinate in an appraisal interview. The tape lasted about 8 minutes.

Manipulation Checks

Manipulation checks for stress were measures of pulse rate immediately after the in-basket exercise, and subjective stress. Subjective stress was assessed using a questionnaire

containing items from Srinivas and Motowidlo (1985) and the Job-related Tension Scale (Kahn, Wolfe, Quinn, Snoek, & Rosenthal, 1964). Internal consistency was .88 for this sample. Example items from the stress questionnaire are presented in Table 1. For items in Part 1, subjects responded using a 5-point "strongly agree" to "strongly disagree" scale. The items were scored so that a high score indicated a high level of subjective stress. For items in Part 2, subjects responded using a 5-point "never" to "nearly all the time" scale. Items from Part 1 and 2 were summed to give a total subjective stress score.

Table 1.

Example Items from the Subjective Stress Questionnaire

Part 1:

- I did not have enough time to complete the in-basket.
- I felt like taking a break while working on the in-basket.
- I was irritated while completing the in-basket.
- I was overwhelmed by all the information that was present in the in-basket.
- I was tired while going through the in-basket.
- I felt very tense while going through the in-basket.

Part 2:

How frequently during the in-basket were you bothered by:

- Being unclear on just what the scope and responsibilities of your task were?
- Feeling that you had too heavy a work load , one that you couldn't possibly finish in the time allotted?
- Feeling that you weren't capable of handling the job?
- Thinking that the amount of work you had to do was interfering with how well it got done?

The Multiple Affect Adjective Checklist (MAACL; Zuckerman & Lubin, 1965) was used to assess mood states. This measure asked respondents to check the adjectives that described the way they felt "right now". Examples of adjectives on the MAACL are: calm, angry, disgusted, friendly, blue, and happy. The MAACL was scored for anxiety, hostility, and depression. The internal consistency reliabilities for these scales were .68, .63, and .69, respectively. Participants were also asked directly how well they believed they performed on the in-basket exercise. It was expected that those subjects in the high stress conditions would be more likely to doubt the quality of their performance. A single item "How well do you think you performed on the in-basket" was used to measure self-rated performance. A 5-point, 1 = very poorly to 5 = very well scale was used.

Dependent Variable

The performance rating scales used were those developed by Borman, et al. (1976) to accompany the performance videotape. They are behaviorally anchored and include 7 different dimensions of performance: structuring the interview, establishing and maintaining rapport, reaction to stress, obtaining information, resolving conflict, developing the subordinate, and motivating the subordinate. Raters were given definitions of each dimension and asked to rate the manager on each dimension using a 1 to 7 scale (1 being lowest performance).

Three measures of rating distortion were collected. These measures were halo error, severity error, and rating accuracy. Halo error was defined as the degree of dispersion exhibited by a rater across performance dimensions. Dispersion for each rater was calculated as the variance across dimensions of the rater's ratings (Borman, 1975). A low dispersion score indicated halo error. Accuracy was defined as the sum of the squared differences between the rater's ratings of the subordinate on a particular dimension, and the subordinate's true score on that dimension. A low difference score indicated accurate ratings. True scores of the stimulus performance were developed by Borman et al. (1976) and were defined as the mean expert rating given on the particular dimension by the industrial experts who served as judges during the validation of the accompanying rating scales. Severity was defined as the extent to which mean performance rating across all dimensions differed from true mean performance across all dimensions. A positive score indicated leniency, while a negative score indicated severity.

In addition to the performance ratings described above, all participants were asked to complete a recognition task, in which they were to report whether they remembered specific aspects of the ratee's performance. This measure consisted of a series of statements containing behavioral descriptions of the ratee's performance. Respondents were asked to indicate whether they recalled each behavior occurring in the

videotape by checking "yes" or "no" for that item. This series of statements included contrived behaviors as well as those actually performed by the stimulus person. The recognition score was simply the number of behavioral descriptions correctly recognized with a high score indicating better recognition.

Participants were also asked to complete a neutral task lasting 45 minutes. This neutral task consisted of a 10-minute water break and completion of Bieri's grid form of the role repertory test (Bieri, Briar, Leaman, Miller, & Tripodi, 1966), which was also the measure of cognitive complexity. Its internal consistency reliability was .78. This measure asked respondents to list the person they knew who best fit one of eight different definitions (e.g., "member of the opposite sex whom you admire most," "member of the opposite sex whom you find hard to like,"). Then, they were asked to rate each of these eight people on a number of personality traits. The measure was scored for the extent to which respondents differentially rated different people, using a grid system. Lower scores on this measure indicated greater cognitive complexity.

Procedure

All participants were given a brief introduction to the study, including a cover story, and asked to sign a statement of informed consent. A measure of their pulse was taken.

Retrieval conditions. Half of the participants in the high stress group and half in the low stress group observed the performance videotape prior to working on the in-basket. Stress was introduced to these individuals during the retrieval phase of the process. Before being shown the videotape, however, these participants completed the neutral task. Another pulse measure was taken following completion of the neutral task. Next, the participants worked on the in-basket exercise for 35 minutes. Upon completion of the exercise, another pulse rate was taken, and subjects filled out the short form of the MAACL (Zuckerman & Lubin, 1965). They also completed the subjective stress questionnaire. Finally, participants rated the performance of the manager in the performance videotape on the rating scales, and completed the recognition task.

Input conditions. The other half of the two stress groups went through the following sequence after a brief introduction to the experiment: pulse rate, in-basket exercise, second pulse rate, MAACL, subjective stress questionnaire, performance videotape observation, neutral task, pulse rate, completion of the rating forms, and the recognition task. For these individuals, stress was introduced during the input phase of the process.

All subjects were asked not to smoke, run, or drink caffeinated beverages during the water break. Addition of the 45-minute neutral task to the two groups makes the time interval between the observation and rating of the performance equal for both retrieval and input conditions. There is a time delay of about 50 minutes for all

participants (see table 2). All participants were debriefed and thanked at the end of the session.

RESULTS

The means and standard deviations for all experimental measures are shown in Table 3. Correlations between measures are given in table 4.

Manipulation Checks

A multivariate analysis of variance was conducted on negative mood (anxiety, hostility, depression), subjective stress, post-in-basket pulse rate, and self-ratings of in-basket performance, to insure that the experimental stress groups differed in their stress levels. The main effect for stress was significant as expected [$F(6,76)=12.50$, $p<.0001$]. The means for each variable under the two stress conditions are presented in Table 5. Baseline pulse rate measured before the experimental manipulation was a covariate in both the MANOVA and subsequent ANOVAs. Univariate ANOVAs indicated that stress groups differed significantly in anxiety level [$F=8.21$, $df=1,81$, $p<.01$], hostility [$F=10.10$, $df=1,81$, $p<.01$], subjective stress [$F=33.78$, $df=1,81$, $p<.001$] and post in-basket pulse rate [$F=40.91$, $df=1,81$, $p<.001$]. The stress manipulation did not produce differences in depression level or self-ratings of performance. High stress groups experienced significantly greater subjective stress, increased pulse rate, anxiety, and hostility as predicted.

Table 2
Summary of the Procedure Sequence for Different
Experimental Conditions

<u>Retrieval Condition</u>	<u>Time(Min)</u>	<u>Input Condition</u>	<u>Time(Min)</u>
1. Introduction	5	1. Introduction	5
2. Measurement of pulse rate	2	2. Measurement of pulse rate	2
3. Neutral task	35	3. In-basket	35
4. Measurement of pulse rate	2	4. Measurement of pulse rate	2
5. Water break	10	MAACL	5
6. Observation of ratee	10	6. Subjective stress measure	5
7. In-basket	35	7. Observation of ratee	10
8. Measurement of pulse rate	2	8. Water break	10
9. MAACL	5	9. Neutral task	35
10. Subjective stress measure	5	10. Measurement of pulse rate	2
11. Performance rating	15	11. Performance rating	15
12. Recognition task	5	12. Recogniton task	5
Total	131		131

Table 3
Means and Standard Deviations of Experimental Measures*

<u>Measure</u>	<u>X</u>	<u>SD</u>
Baseline pulse	72.57	12.25
Pot-in-basket pulse	72.31	11.56
Neutral task pulse	68.01	9.09
In-basket performance (self rating)	3.39	0.97
Anxiety	8.26	3.55
Depression	14.57	4.61
Hostility	9.68	3.25
Cognitive complexity	73.83	19.43
Subjective stress	43.88	10.02
Recognition	25.02	3.46
Severity	.162	0.85
Halo	1.31	0.43
Accuracy	24.67	10.91

*Possible subjective stress scores ranged from 16 to 80.
 Cognitive complexity scores ranged from 39 to 144.
 (Lower values indicate higher complexity).
 Possible recognition scores ranged from 0 to 33.
 Severity scores ranged from -1.82 to 1.74.
 (Negative value indicate severity).
 Halo scores ranged from 0 to 2.25.
 (Lower values indicate halo).
 Accuracy scores ranged from 3.77 to 54.85.
 (Lower scores indicate accuracy).

Table 4
Pearson Correlation Coefficient for Experimental Measures

	1	2	3	4	5	6	7	8	9
1. Anxiety ---		.72***	.70***	.04	.64***	-.07	.27**	.07	.29**
2. Depression ---			.67***	.08	.41	-.08	.19	.05	.19
3. Hostility ---				.07	.51***	-.17	.09	-.04	.19
4. Cognitive Complexity ---					.13	-.06	.09	-.04	.32**
5. Subjective stress ---						-.17	.17	.01	.32**
6. Recognition ---							-.01	.11	.22*
7. Severity ---								.12	.18
8. Halo ---									.09
9. Accuracy ---									

Higher scores indicate better recall.
 Negative scores indicate severity.
 Lower scores indicate halo.
 Lower scores indicate accuracy.

*** $p < .001$

** $p < .01$

* $p < .05$

Table 5
Cell Means for Manipulation Check Variables under High and Low Stress Conditions

Variables	<u>High Stress Condition</u>		<u>Low Stress Condition</u>	
	(N=42)		(N=42)	
	X	(sd)	X	(sd)
Anxiety	9.33	(3.73)	7.19	(3.05)
Depression	14.79	(4.52)	14.36	(4.74)
Hostility	10.74	(2.91)	8.62	(3.25)
Subjective stress	49.29	(8.53)	38.48	(8.42)
In-basket pulse	77.71	(10.36)	66.90	(10.16)
In-basket performance (self-rating)	3.24	(0.85)	3.55	(1.06)

Hypothesis 1

A two-way analysis of variance was conducted on halo in ratings, with stress level (high vs. low) and timing of stress presentation (input vs. retrieval) serving as independent variables. The cell means and standard deviations for halo are presented in Table 6. This analysis revealed no significant main effects of stress level or timing of stress presentation on halo. No significant interaction was observed. It appears that neither stress nor timing of the stress manipulation had any impact on the halo error exhibited by raters.

Hypothesis 2

A two-way analysis of variance was conducted on the severity of ratings. Cell means and standard deviations for this analysis are presented in Table 6. Results reveal no significant main effects of stress level or timing of stress presentation on severity. No significant interaction was found. Neither stress level nor timing of stress had any significant impact on the severity with which raters assigned performance ratings.

Hypothesis 3

A two-way analysis of variance was conducted on the accuracy of ratings. Cell means and standard deviations are presented in Table 6. This analysis revealed significant main effects of stress level [$F=6.99$, $df=1,80$, $p<.05$] and timing of stress presentation [$F=5.36$, $df=1,80$, $p<.05$] on rating accuracy. No significant interaction effect was found. These results indicate that, as stress level increased, rating accuracy decreased, regardless of when that stress was introduced. Rating accuracy also was significantly lower when stress (either high or low) was introduced during the retrieval phase, as compared to the input phase.

An additional two-way ANOVA was conducted on information recognition, with stress level and timing of stress manipulation again serving as independent variables. Cell means and standard deviations for this analysis are presented in Table 6. Results indicate a significant main effect of timing of stress manipulation on recognition [$F=5.92$, $df=1,80$, $p<.05$] and a significant interaction between stress and timing [$F=4.43$, $df=1,80$, $p<.05$]. Raters in the retrieval condition correctly recognized significantly less performance information than those in the input condition. In addition, this difference was much greater for raters in the low stress conditions (See Table 6). It appears that, under stressful conditions, timing does not have a substantial effect on information recall, but under conditions of low stress, recall is much worse in the retrieval condition. The high stress somehow lessened the effect of timing.

The question concerning rater cognitive complexity was examined by comparing the correlations between cognitive complexity and each of the rating variables (i.e., halo, severity, accuracy and recognition) under different experimental conditions. These correlations are presented in Table 7. The correlation between cognitive complexity and

rating accuracy was significant in the high stress condition (regardless of timing of stress presentation), and in the input condition (regardless of stress level). No other correlations reached significance. Cognitively complex raters were more accurate than cognitively simple raters, especially under high stress or when stressed before input. Correlations were transformed to Fisher's Z values, and a test of significance of the difference between correlations in each stress condition and each timing condition was conducted. There were marginally significant differences between correlations of cognitive complexity and halo, recognition, and accuracy across stress levels ($p < .10$).

Table 6
Cell Means for Dependent Variables by Stress
and Timing of Stress Presentation Conditions

Variables	High Stress		Low Stress	
	Input (N=21)	Retrieval (N=21)	Input (N=21)	Retrieval (N=21)
	<u>X</u> <u>(sd)</u>	<u>X</u> <u>(sd)</u>	<u>X</u> <u>(sd)</u>	<u>X</u> <u>(sd)</u>
Favorability	.32 (.65)	.07 (1.05)	.29 (.69)	-.03 (.96)
Dispersion	1.39 (.44)	1.21 (.39)	1.29 (.48)	1.34 (.38)
Accuracy	26.22(11.74)	29.06(11.72)	17.93 (8.56)	25.48(8.64)
Recognition	25.00 (4.17)	24.76 (3.70)	26.81 (2.58)	23.52(2.50)

Table 7

Pearson Correlation Coefficient between Cognitive Complexity and Rating Variables under Different Experimental Conditions

Variables	<u>Stress</u>		<u>Timing</u>	
	High (N=42)	Low (N=42)	Input (N=42)	Retrieval (N=42)
Halo	\bar{r} .19	\bar{r} -.24	\bar{r} -.06	\bar{r} .04
Favorability	.24	.06	.18	.13
Accuracy	.44**	.11	.40**	.29
Recognition	.09	-.29	.20	.06

** $p < .01$

* $p < .05$

DISCUSSION

Hypothesis 1

Stress level had no effect on the halo error in ratings. Halo was defined as the variance across dimensions of the rater's ratings. This finding does not support the psychic-cost theory--that raters will rely on global impressions of overall performance when rating individual aspects of performance under stressful conditions. Halo did not correlate significantly with any of the other experimental measures. It may be that halo was not appropriate measure of distortion under these conditions, and that distortion was manifested in some other way, such as low rating accuracy. This will be discussed in a later section.

Hypothesis 2

Raters in the high stress conditions did not give more severe ratings than raters in the low stress groups, as was predicted by the frustration-mood hypothesis. Although stressed raters did report feeling more anxiety and hostility, these mood states did not seem to influence the severity with which they rated the stimulus person. In fact, anxiety was inversely correlated with severity ($r = -.27$, $p < .01$), such that severity of ratings decreased as anxiety increased. It may be that anxious raters sensed this mood state in themselves, and were concerned with the possibility of it affecting their ratings. In order to compensate for this and prevent it from happening, they may have given more favourable ratings than they would have otherwise.

Another explanation of this relationship is that supervisors or evaluators who have no prior experience with the stimulus task tend to see the task as more difficult and to be more tolerant of subordinate poor performance (Mitchell & Kalb, 1982). These raters are therefore less likely to make low performance ratings. The raters in this study were not likely to have had any experience with the interviewer's task, and may have attributed any poor performance to the difficulty of the task, not to any ability or motivational deficits of the ratee. The fact that more anxious raters had

just completed a difficult managerial task themselves may have enhanced the perception of the ratee's task as difficult, and made them more sympathetic to the ratee's situation. This would account for the inverse relationship between anxiety and severity error.

Another possible explanation for the lack of support found for the frustration-mood hypothesis is that feelings of depression are a main determinant of severity error. Since high stress conditions did not lead to significantly greater depression, there would be no reason to expect favorability of ratings to differ on the basis of stress level. The fact that depression may be considered a "down" state, whereas anxiety and hostility are considered "up" or aroused states may partially account for the lack of a significant effect of stress level on ratings. Rater mood may have some effect on the accuracy of performance ratings, but not necessarily by way of the mechanism proposed by the frustration-mood theory.

The measure used to assess mood state may also contribute to the lack of effect for this variable. The MAACL assesses general mood, not job-related affect. Although participants were asked to report their affect in terms of how they felt immediately after completing the in-basket, it is possible that any feelings reported could have been attributable to factors other than the stress manipulation. Perhaps a more appropriate measure of mood state would be one that is more specific to the particular job or task.

Hypothesis 3

Stressed raters gave significantly less accurate ratings than non-stressed raters. Accuracy was defined as the sum of the squared differences between the rater's ratings and the ratee's true scores, such that a small value indicates high accuracy. In addition, accuracy was significantly correlated with two measures of stress--subjective stress ($r=.32$, $p<.01$), and anxiety ($r=.29$, $p<.01$), indicating inverse relationships between rating accuracy and these two measures. These results lend some support to the psychic cost theory. If stressed raters have less cognitive energy to devote to the rating task, they may, instead of relying on global impressions of performance, simply rate in a rather random, inaccurate fashion, without attending to particular behavioral dimensions. This does not imply a halo effect. Another explanation of the effects of stress on accuracy but not halo is that stressed raters may remember less about the performance, and therefore give inaccurate evaluations. The analysis of the effect of stress level on recognition memory does not lend support to this notion, however. There was no main effect of stress level on recognition. The interaction results show that the decreased recognition of raters in the retrieval phase was actually minimized under conditions of high stress. Stress acted in some way to deter the inhibition of memory of these raters.

The raters' inexperience with the appraisal task may have contributed to the effect of stress on accuracy but not

halo. Individuals who have not developed a schema or prototype of the "successful manager" in the particular situation depicted in the scenario will be unable to fall back on any schema as a basis for evaluation. Unable to attribute illusory characteristics of that schema to the ratee, these raters will not form global impressions of the ratee, and therefore will not exhibit a great deal of halo error. This does not, however, imply that their ratings will be more accurate. The student raters in this study were not likely to have had the opportunity (i.e., experience with the task) to develop such a schema.

The question of when stress has an effect on rating accuracy was addressed by examining main effects of the timing variable on dependent measures, and the stress X timing interactions. The only significant effects were on the accuracy measure. The raters who were exposed to either stress manipulation during the retrieval phase of the process were significantly less accurate than those in the input conditions. The stress X timing interaction was not significant for any of the dependent variables. The presence of a main effect of timing, with no stress X timing interaction is certainly perplexing. It would be expected that if the stress manipulation were salient, as is indicated by the MANOVA and ANOVA results, a significant interaction should be found. One explanation is that raters in the input conditions were given a 10-minute water break immediately following the observation of the performance. Since there were no apparent competing demands on memory during the break, there was an opportunity for what was just observed to be encoded and stored in memory properly. Raters in the retrieval conditions, however, began the in-basket soon after observing the performance, and may have not been able to store performance information properly when under these distracting circumstances. Even though raters in the input conditions were stressed prior to observing the performance, this did not seem to have as strong an effect on rating accuracy as stress during retrieval of performance information. This supports the contentions of Ilgen and Feldman (1983) that the rating process is more of a memory-based phenomenon than a stimulus-based one, although the issue concerning competing demands during information storage (discussed above) should be kept in mind. Further support for the notion of rating as a memory-based process is given by the significant correlation between recognition and accuracy ($r = -.22$, $p < .05$). Raters who correctly recognized more information about the performance were more accurate in their rating.

A significant positive correlation between cognitive complexity and accuracy of ratings ($r = .44$, $p < .01$) indicates that as cognitive complexity increases, accuracy increases. This supports the findings of Cardy and Kehoe (1984). This relationship holds true only under conditions of high stress or input, indicating that stressed raters, whose attention to the stimulus performance is hindered, are more likely to make

accurate judgments if they are better able to differentiate between multidimensional stimuli (i.e., are more cognitively complex). It appears that this ability may help raters who are distracted during observation and encoding of performance stimuli overcome this distraction, and successfully input the necessary information.

Overall, these results indicate that stress does lead to the distortion of performance ratings, but only when distortion is defined in terms of accuracy, and not when defined as halo or severity error. Therefore, the psychic cost hypothesis is supported, but some redefinition is needed. This theory states that stress will drain a person's store of cognitive energy, thereby causing him or her to operate in an automatic mode of processing on subsequent tasks. In an attempt to conserve energy, he or she will use a global impression or prototype as a basis for judgments concerning different dimensions of another person's performance. This will result in halo error. There was no evidence of such an effect. However, there is evidence that high levels of stress will lead to a loss of rating accuracy, although the mechanism by which this occurs is unclear. It may be a function of random assignment of ratings (perhaps due to a lack of familiarity with the stimulus task, and therefore a lack of a developed prototype or standard of comparison for it), faulty memory of the rater, or both. It may be difficult to store and therefore remember information that is not categorized within a well-developed schema.

These findings are partially supportive of Srinivas and Motowidlo (1985). As in their study, severity of ratings was not significantly affected by rater stress. Contrary to their results, however, high stress did not lead to greater halo error. This may be, in part, due to the correction in the present study of the time delay confound. When accuracy was defined as the amount of discrepancy between experimental ratings and the ratee's true scores, as in this study, rater stress did have an adverse effect. Such a measure of accuracy was not collected in the earlier study. There is partial support for the previous findings that stress has its impact during the retrieval phase of the appraisal process, in that subjects in the retrieval conditions exhibited significantly lower accuracy in ratings. However, the stress X timing interaction failed to reach significance, which indicates that the previous significant interaction may have been due to the time delay confound present in the earlier design.

CONCLUSIONS

The finding that stress has a greater effect when presented during the retrieval phase of the appraisal process lends further support to the previous findings (Heneman & Wexley, 1983) that ratings done immediately after observation of the performance are more accurate than ratings done after a time delay. If the rater stress-accuracy relationship is largely a function of memory, ratings should be given as soon after observation as possible.

In terms of rater stress itself, steps might be made (either on the individual or organizational level) to reduce the stress experienced by supervisors during appraisal time, in order to allow them more time and energy to devote to the task. This might involve a reduced workload during this time, stress management education, and time off for appraisal training (or retraining). If raters can be taught to recognize their personal symptoms of stress, they may be able to anticipate rating inaccuracies, and prevent them. Also, performance appraisals might be scheduled around less stressful times during the rater's year. Or supervisors experiencing great amounts of stress may be allowed to postpone their appraisal duties. Whatever the method, the alleviation of rater stress during performance appraisal should have positive effects on the accuracy of ratings, and the meaningfulness of the appraisal system on the whole.

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